MATH 211: ORDINARY DIFFERENTIAL EQUATIONS AND LINEAR ALGEBRA

FALL 2014

Course information:

- **Instructor**: Dr. Zhenghe Zhang, zzhang@rice.edu
- **Office**: Herman Brown 426
- **Class meeting**: 09:00AM–09:50AM, MWF, HBH 227
- **Office hour**: WF 2-3pm or by appointment
- **Text**: *Differential Equations and Linear Algebra* (2nd Edition), Farlow, Hall, McDill, and West
- **Class Website**: Math 211 004 F14 on Owlspace

Grades:

Homework: 15%
Midterm 1: 20%
Midterm 2: 25%
Final Exam: 40%

Exams:

Midterm 1: **(Tue) Sep 30, 7PM-8:30PM, SEW301**
Midterm 2: **(Wed) Nov 05, 7PM-8:30PM, DCH1070**
Final Exam: **(Wed) Dec 10, 7PM-10PM**

It is the policy of the Mathematics Department that no final may be given early to accomodate student travel plans. If you make travel plans that later turn out to conflict with the scheduled exam, then it is your responsibility to either reschedule your travel plans or take a zero in the final.

Books, notes, and calculators will not be allowed. Please also pack your cell phones away throughout an exam.

Homeworks:

Homeworks will be assigned weekly and be collected Monday at the beginning of class. **No late homework will be accepted!** I recommend the following: first, try your best to solve the homework problems; then work with other students to exchange ideas and methods. You must write and understand your own solution. The lowest two homework grades will be dropped for the calculation of final grade.

Participation & Attendance:

Attendance is not required. However, I expect students to attend every class and arrive on time. It is your responsibility to keep informed of all the announcements and materials covered during class. While Owlspace is an important resource, not all announcements will be posted there.

Disability Support:

If you have a documented disability that will affect your work in this class, please contact me within the first week to discuss accommodations. Students with disabilities will also need to contact disability support center.

Tentative Schedule:

The following is a tentative schedule for this course.

All of Chapters 1, 2, and 3.
Chapter 4: Sections 4.1-4.6
Chapter 5: Sections 5.1-5.3
All of Chapter 6
Chapter 7: Sections 7.1-7.2
Chapter 8: Sections 8.1-8.2

More concretely, we will try the following schedule:

Week 1:
08/25 Section 1.1: Dynamical Systems: Modeling
08/27 Section 1.2: Solutions and Direction Fields: Qualitative Analysis

08/29 Section 1.3: Separation of Variables: Quantitative Analysis

Week 2:
09/01 No class, Labor Day
09/03 Section 1.4: Approximation Methods: Numerical Analysis
09/05 Section 1.5: Picard's Theorem: Theoretical Analysis

Week 3:
09/08 Section 2.1: Linear Equations: The Nature of Their Solutions
09/10 Section 2.2: Solving the First-Order Linear Differential Equation
09/12 Section 2.3: Growth and Decay Phenomena

Week 4:
09/15 Section 2.4: Linear Models: Mixing and Cooling
09/17 Section 2.5: Nonlinear Models: Logistic Equation
09/19 Section 2.6: Systems of Differential Equations: A First Look (1)

Week 5:
09/22 Section 2.6: Systems of Differential Equations: A First Look (2)
09/24 Section 3.1: Matrices: Sums and Products
09/26 Section 3.2: Systems of Differential Equations

Week 6:
09/29, Review
Tue, 09/30, 7PM-8:30PM, First Midterm Exam
10/01 Section 3.3: The Inverse of a Matrix
10/03 Section 3.4: Determinants and Cramer's Rule

Week 7:
10/06 Section 3.5: Vector Spaces and Subspaces
10/08 Section 3.6: Basis and Dimension
10/10 Section 4.1: The Harmonic Osicllator

Week 8:
10/13 No class, Midterm Recess
10/15 Section 4.2: Real Characteristic Roots
10/17 Section 4.3: Complex Characteristic Roots

Week 9:
10/20 Section 4.4: Undetermined Coefficients
10/22 Section 4.5: Variation of Parameters

10/24 Section 4.6: Forced Oscillations

Week 10:
10/27 Section 5.1: Linear Transformations
10/29 Section 5.2: Properties of Linear Transformations
10/31 Section 5.3: Eigenvalues and Eigenvectors

Week 11:
11/03 Section 6.1: Theory of Linear DE Systmes
11/05 Review
Wed, 11/05 7PM-8:30PM: Second Midterm Exam
11/07 Section 6.2: Linear Systems with Real Eigenvalues

Week 12:
11/10 Section 6.3: Linear Systems with Nonreal Eigenvalues
11/12 Section 6.4: Stability and Linear Classification
11/14 Section 6.5: Decoupling a Linear DE Systems (skipped)

Week 13:
11/17 Section 6.6: Matrix Exponential (skipped)
11/19 Section 6.7: Nonhomogeneous Linear Systems
11/21 Section 7.1: Nonlinear Systems

Week 14:
11/24 Section 7.2: Linearization
11/26 Section 8.1: The Laplace Transform and Its Inverse
11/28 No class, Thanksgiving

Week 15:
12/01 Section 8.2: Solving DEs and IVPs with Laplace Transforms
12/03 TBA
12/05 Review, last day of classes

Remark: The instructor reserves the right to make changes to this syllabus without prior notice. However, once changes are made you will be notified of those changes.